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ABSTRACT

Relationships among behaviors, defined within each of several observation systems, were determined and relationships across systems were examined to empirically derive dimensions of classroom behavior. These four observation systems were selected to include as broad a range of categories as possible: Fuller Affective Interaction Records (FAIR), Observation Schedule and Record--Form 5 (OScAR), Cognitive Components System (CCS), and Coping Analysis Schedule for Educational Settings (CASES). Observations were made from 138 lessons videotaped in fifth and eighth grade classrooms. Observational data from each system was summarized and intercorrelated. Correlations among categories within systems were factored to yield intra-system dimensions. Factors for each observation system and the relationships between factors are discussed in detail. The eleven behavioral dimensions represent overlap among factors obtained from each of the four coding systems. (PR)

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Dimensions of Classroom Behavior

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Dimensions of Classroom Behavior

Abstract

The objectives of this study were 1) to determine the relationship among categories on each of four classroom observation instruments, and 2) to determine the relationships among dimensions of classroom behavior across systems. Four observation systems were used: Fuller Affective Interaction Records (FAIR); Observation Schedule and Record, Form 5 (OScAR); Cognitive Components System (CCS) and Coping Analysis Schedule for Educational Settings (CASES). Observations were made a total of 140 occasions in 28 fifth and eighth grade classrooms. Factor analyses were done on the intercorrelations among category scores. Results include factors for each observation system and relationships between factors on the different systems.

Purpose

In recent years the study of classroom behavior has been facilitated by the development of a variety of observational instruments. Simon and Boyer's fifteen volume anthology Mirrors for Behavior (1967, 1970) contains nearly 80 systems, most of which focus on classroom behavior. Many other systems have been or are being developed. There have been, however, very few investigations[1] of the relationships among behaviors categorized on different systems. Similarly, system developers seldom examine intra-system relationships empirically. Instead, categories are combined on the basis of logical, theoretical, or other grounds in order to form behavioral dimensions. By way of analogy, it would be similar to a test developer arbitrarily defining subscales from subsets of test items without determining their internal consistency, or without ever investigating their relationships with other tests.

The objectives of this study were 1) to determine the relationships among behaviors defined within each of several observation systems and 2) to examine relationships across systems in order to derive empirically dimensions of classroom behavior.

Methods and Procedures

As part of another study of the effects of consultation with teachers, 138 lessons were video taped. These were obtained in twenty-eight fifth and eighth grade classrooms in six schools, with all but one class being observed five times. One class was observed only three times. Each fifth grade class was observed in mathematics, social studies, and science lessons. Eighth grade classes included approximately equal numbers of mathematics, social studies, English and science classes. Observations were made at

[1]Studies conducted by Ober, Wood, and Cunningham (1970) and Medley and Hill (1968) investigated between system relationships. Ryans (1960) study which he described in Characteristics of Teachers was also an investigation of teaching dimensions, although ratings were used as the data source rather than behavior categories.

five to six week intervals in each classroom, and were each one-half hour in length. All codings of the observations were made from the video tapes.

Four systems were used to code the observations. Each system was designed for use in classrooms, none was intended for a particular content area (i.e., each system had been developed for use in a wide variety of classroom settings).

The observation systems were selected, in part, to include in the study as broad a range of behavioral categories as possible. The four observation systems[2] used were:

1. CASES (Coping Analysis Schedule for Educational Settings), developed by Spaulding, codes individual student behaviors including negative attention getting, passive aggression, self-directed activity, attentiveness, observation, cooperative behavior, and others. Since CASES is designed for observation of individual students, four pupils were selected for observation in each classroom (two of the pupils were "underachievers," two pupils were "overachievers" as defined by test data). Scores were combined for the four students in each class, after preliminary analysis revealed few reliable differences among over- and underachievers. Data are expressed as a percentage of total time spent in each category.

2. FAIR (Fuller Affective Interaction Records) contains categories describing teacher and student behaviors that are primarily in the affective, interpersonal realm although several categories (e.g. lectures, manages) are content or procedure, oriented (Fuller, 1970). Examples of categories are Criticizes, Delves, Manages, Owns up, Values, Nurtures,

[2]Two of the systems (FAIR, CASES) are available in Mirrors for Behavior. A third system, OScAR 5, is similar to OScAR 4, which is reproduced in the anthology. The fourth system (CCS) is similar to several other systems in the anthology, and is available from the author.

Confirms. There are equal numbers of teacher and student behaviors. Data obtained for this study are expressed as percentages of time observed in each category.

3. OScAR 5 (Observation Schedule and Record), developed by Medley and others (1968), codes behavior occurring alone as well as exit or entry behaviors in a sequence. Categories differentiate four types of pupil behavior, four types of teacher questions, several modes of response to pupil behavior (from support to criticism), problem structuring, informing, no evaluation, and several procedural and management teacher behaviors. Basic data for the present study are percentages of total units (interchanges or standing alone) coded in the category.

4. CCS (Cognitive Components System, Emmer and Albrecht, 1970) differentiates content behaviors of teachers and students into association, description, conceptual, generalization and explanation levels. Further distinctions are made according to whether the behavior is soliciting, informing, or responding. Data are expressed as percentages of total units of cognitive behavior in each category.

The reader who is unfamiliar with the systems used in this study can examine the categories and their definitions in the appendix to this paper.

Data for each system from the 138 observations were summarized and intercorrelated. Correlations among categories within systems were factored (principal azis, varimax rotation) to yield intra system dimensions. Variables with factor loadings greater than .3 (ignoring the sign) were used to define factors.

In order to minimize spurious factors, inter-observer agreement for each category in each system was computed, using intraclass correlations

of the coders based on samples of the video taped lessons. Only those categories having reliable inter-observer agreement were retained for analysis (cf. appendix for listings of the intraclass correlations). Generally, the discarded categories were those which were very infrequently observed. Basic data for the factor analyses were, for FAIR and OScAR, based upon the average score in each category for pairs of observers. For CCS and CASES, the data were based on individual coders.

Factors from CASES

Three factors were extracted, accounting for 64 percent of the variance.

1. Attention vs. Routine Activity (30 percent)

Pays attention	+ 86
Inappropriate sharing, helping	-.64
Seeks support, information	-.68
Follows directions	-.78

The factor was named Attention vs. Routine Activity, the latter pole so named because it seems to reflect predictable mode of response to certain classroom activities. In fact the factor appears to contrast modes of response to two types of activity. One type of activity elicits attending behaviors and the other type of activity (e.g. board work; or teacher dictates problems to be solved by everyone in their seats) elicits behavior on the other end of this factor.

This factor also reflects a built in dependence among the categories. That is, Pays Attention and Follows Directions were the two most frequently occurring behaviors (57 percent and 12 percent respectively). If a student is coded as following directions he will not also be coded as paying attention. Therefore, the most frequently occurring category will be negatively correlated with at least one other category.

2. Passive, inactive behavior (19 percent)

Observes Passively	.77
Responds to Internal Stimuli	.75
Inappropriate sharing and helping	.31
Follows directions	-.40

This factor seems primarily to represent non-engaged pupil behavior. A student scoring high on this dimension would appear to lack involvement in the classroom's activities. The low, negative loading for follows directions seems best explained by the nature of certain classroom activities. If a number of directions are given in some activity, it is likely that students are responding to these (follows directions) and are therefore less likely to be engaged in the passive behaviors that make up the positive end of this factor.

3. Inappropriate vs. appropriate social behavior (15 percent)

Inappropriate self-directed activity	.79
Appropriate sharing and helping	-.71

This factor seems to indicate simply a tendency for "doing your own thing," although judged "inappropriate" for the particular activity, versus working with others appropriately. The dimension possibly reflects aspects of an independence-affiliation continuum.

Factors from FAIR

Nine factors were extracted accounting for approximately 70 percent of the variance.

1. Students present vs. Routine (10 percent)

Student: Brings Out	.91
Teacher: Initiates	.46
Student: Encourages	.44
Teacher: Corrects	.32

Student: Usual -.84

At one end of this factor, students are presenting information or opinions. The teacher is not lecturing, but instead is asking broad questions and initiating probes, while students are providing some encouragement to each other or to the teacher. Negatively correlated with the factor are routine responses to teacher questions and directions.

2. Criticizing - Resisting (10 percent)

Student: Resists	.74
Teacher: Criticizes	.66
Teacher: Corrects	.63
Student: Questions	.54
Student: Usual	-.35
Teacher: Initiates	-.35
Teacher: OK's	-.42

At one end of this factor, pupils are engaged in passive aggressive behavior (resists). The category "Questions" includes questioning or pondering a preceding response. The teacher is critical of student behavior and requests a specific behavior change. The negative loadings for Teacher Initiates (probes, broad questions) and for Teacher OK's and Student Usual (Routine responding) indicates this dimension is somewhat unlikely to occur during some routine activities or with expansive teacher behavior.

3. Teacher: Responds vs. Presents (8 percent)

Teacher: Lectures	-.85
Teacher: Initiates	-.54
Teacher: Corrects	.30
Teacher: OK's	+.39
Teacher: Delves	.38

Teacher: Ponders .44

The defining variable (-) for this factor is teacher lecture. Four positive loadings are for behaviors which are responsive to students. High negative scores on this factor indicate activities in which the teacher's presentation of content is the overriding concern; the lower negative loading for teacher initiates (broad question) and positive loadings for responsive teacher behaviors suggest that whatever is the students' reaction to the teacher's questions, the teacher avoids making use of the reaction. Since Teacher: Initiates loads on the same end of the dimension as Lecture, and there are no pupil behaviors on this end of the dimension, it may be that the teacher's initiations are less an invitation to participate than they are an attentional technique.

4. Expansive vs. Restrictive (9 percent)

Teacher:	Delves	.77
Teacher:	Confirms	.51
Student:	Zeal	.39
Student:	How	-.33
Teacher:	Manages	-.84

At one end of this factor are probing, information seeking teacher behaviors (Delves), and using student ideas and incorporating them (Confirms) into the lesson. Student enthusiasm (Zeal) is also correlated with the factor. At the opposite end of the axis are restricting behaviors: giving procedural directions and asking narrow questions (Manages); and, for pupils, asking for a specific answer or direction (How).

5. Clarifying (students) (8 percent)

Student:	OK's	.81
Student:	Suggests	.76
Student:	How	.61

Student behaviors only load on this factor, which contains: students request or suggest a change of behavior or procedure (Suggests); acknowledgement that the teacher is correct (OK's); and seeking a specific answer or direction (How). Taken together, these behaviors seem most likely to occur when some content or procedure is clarified, or when clarification is sought by pupils.

6. Teacher candor (6 percent)

Teacher:	Owns up	+.78
Student:	Zeal	+.63
Teacher:	Ponders	+.34
Teacher:	OK's	-.43

Positive loadings appear on this factor for the behaviors: teacher admits error or self-disapproval (Owns up); student responsiveness and enthusiasm (Zeal); and, to a lesser extent pondering a student response or expressing doubt. This factor may reflect disagreements over some point of information or opinion, and student interest in defending the point of view with which the teacher disagrees and finally admits a mistake. Evidently it is not an unfriendly disagreement since Student Resists and Teacher Criticizes are not correlated with the factor. Another activity in which this factor might be observed is one in which a teacher deliberately errs, with the expectation that his mistake will be caught by the students. The factor may also reflect an association between an "honest" or open teacher and class enthusiasm.

7. Supporting vs. Seeking information (6 percent)

Teacher:	Nurtures	.73
Teacher:	Lectures	-.36

Student: Encourages	-.43
Student: Explores	-.56

Focused encouragement, hints, praise and approval are classified as Nurtures. At the other end of this dimension the student is seeking information (Explores). The negative loading for lecturing suggests that teacher supporting behavior is less likely during information giving activities. The negative loadings for student encourages and explores indicate that these are not concommitant with teacher nurturance, and in fact, are less likely in the presence of more teacher nurturance.

8. Student initiated discussion (7 percent)

Student: Generates	.76
Teacher: Confirms	.55
Student: Questions	.45
Student: Explores	.34
Student: Zeal	-.35

On this factor pupils question or ponder a preceding response (Questions), and initiate their own ideas (Generates) or seek new information (Explores). The positive loading for Teacher: Confirms indicates that the teacher is making use of student ideas during the activity. Taken together, these behaviors suggest a discussion that is oriented toward student ideas. The negative loading for Student: Zeal means that the discussion is relatively unenthusiastic.

9. Teacher tangential (5 percent)

Teacher: Tangential	.86
Student: Encourages	.32

Factor IX is not very well defined, being made up primarily of tangential ("out to lunch") teacher behavior. Student encouraging statements are slightly correlated with the factor.

Factors from OScAR

Eight factors, accounting for 77 percent of the variance, were extracted.

1. Student-idea oriented vs. teacher-idea oriented (12 percent)

No evaluation	.97
Pupil response	.90
Pupil statement	.32
Informing	-.55

The positive end of this factor is defined by a non-behavior: no evaluation. In order for this behavior to be coded, some pupil verbal behavior must have occurred, subsequent to which the teacher does not respond, either by acknowledgment, support, rejection, etc. Pupil Response, in the OScAR system, does not have the usual connotation of an answer to a specific teacher question. Instead, it denotes a response to another pupil, or indirectly to the teacher. Thus, the positive end of this factor appears to characterize discourse in which the teacher avoids evaluating pupil behavior, and in which pupils primarily respond to each other and indirectly to the teacher. At the other end of this factor is teacher informing, in which the teacher presents, or lectures. We conclude that the dimension reflected by this factor is best characterized by orientation to student ideas versus presentation of content.

2. Convergent evaluative vs. Divergent teacher behavior (11 percent)

Rejecting	.78
Convergent Question	.77
Approving	.34
Elaborating 1 question	.31
Pupil statement	-.35
Divergent question	-.64

At one end of this factor we find behaviors commonly associated with a drill pattern: convergent questions, and two relatively non-affective teacher evaluations of student responses (in OScAR, Rejecting and Approving are neutral acknowledgement of the incorrectness or correctness of a pupil response). The positive loading for elaborating 1 question probably reflects a tendency to ask the same pupil the same question after rejecting his first answer. The negative loadings for PST and DVG suggest that the underlying dimension reflects a focus upon single, "right" answers versus divergent discussion, although the negative end of this factor is less well defined than the positive end.

3. Problem solving, teacher directed (10 percent)

Elaborating 2 questions	+.89
Problem structuring	+.72
Divergent questions	+.34
Directing	-.41
Pupil Questions	-.45

Elaborating 2 questions solicit from a student a response that is dependent upon a previous response from another student. Problem structuring is raising issues, questions, problems for the class to consider, rather than addressing the question to a particular student. The high relationship between these two variables and this factor suggests problem solving activities in which, for example, the teacher raises an issue or problem, and after a student presents a solution, asks other students to add to it or comment upon it. That pupil questions loads at the other end of this factor may indicate that the dimension reflects mainly teacher initiated problems.

4. Considering - Supporting (9 percent)

Supporting statements	+.89

Considering statements	+.86
Convergent questions	+.36
Directing	+.30

This factor is defined primarily by positive teacher affect. The correlation of both convergent questions and directing statements with this factor indicates that positive affect is somewhat more likely to occur in the context of activities that are more teacher-directed, or equally plausible, that high scores on this factor are more characteristic of teachers who engage in such activities.

5. Procedural interaction vs. discussion (9 percent)

Procedural, non substantive, teacher question	.72
Directing	.65
Pupil non substantive utterance	.59
Problem structuring statements	-.33
Pupil statements	-.48

A high score on this factor could be obtained by extended discussion of procedures among teacher and students. The negative correlations of PBST and PST with the factor indicate that the procedural interactions are less likely to occur during activities having more substantive pupil statements or problem structuring.

6. Desisting (9 percent)

Desist statements	.78
Pupil Questions	.50
Pupil Non substantive utterances	.44
Rebuking statements	.40

Desist statements request students to stop doing something. The positive loading of Pupil Questions, a substantive behavior, and pupil

non substantive utterances may indicate that the desisting (and rebuking) behaviors are occurring during a substantive activity, and possibly that students are verbally reacting (PNS) to the Desist order. The loading of pupil questions may also indicate that activities or classes in which pupils initiate substantive questions may also provide more than their share of behaviors for teachers to react to with desist statements.

7. Lecture vs. Recitation (9 percent)

Informing statements	.62
Elaborating 1 question	-.35
Pupil statements	-.54
Approving statements	-.77

At one end of this factor the teacher is asking the same pupil another question (ELI), and pupils are responding to each other or indirectly to the teacher (PST). The teacher is indicating the correctness (Approving) of pupil responses or statements, but does not praise (supports). Taken together these behaviors suggest recitation activities. At the other end of the factor are informing statements by the teacher.

8. Controlling (8 percent)

Rebuking statements	.81
Procedural positive	.79
Procedural, non substantive, question	.33

Rebuking statements stand alone in OScAR; that is, they are not exits from an interchange between teacher and student. Procedural positive statements typically are utterances giving permission to students. The combination of the two behaviors could occur as a result of students taking advantage of the teacher's permission to do something. A high score on this factor may also reflect a tendency by some teachers to be procedurally facilitating with certain pupils and restricting with others.

Factors from CCS

Eight factors were extracted, accounting for 75 percent of the trace.

1. Conceptual behavior (13 percent)

Teacher solicits, level 3:	conceptual	.93
Student responds, level 3:	conceptual	.93
Teacher responds, level 3:	conceptual	.63
Teacher presents: level 3:	conceptual	.45
Teacher responds: level 4:	inferential	.37
Teacher presents: level 4:	inferential	.35
Student presents: level 3:	conceptual	.31

This factor indicates that the conceptual categories cluster together, with a slight tendency for inferential teacher behavior to be associated with the factor. This latter association may reflect a logical progression (on the part of the teacher) from dealing first with concepts and then extracting a principle or generalization from the association of several concepts. To a greater extent however, this factor reflects the tendency for teacher questions and pupil responses to be on the same level.

2. Description vs. Inferential Behavior (11 percent)

Student response, level 2:	description	.66
Teacher solicits, level 2:	description	.61
Student presents, level 4:	inferential	-.56
Teacher responds, level 4:	inferential	-.72
Teacher solicits, level 4:	inferential	-.80

At one end of this bipolar factor are descriptive behaviors: relatively low level data reporting, including teacher question-pupil answer of a factual nature. The other end of the factor has inferential behaviors.

3. Explanation (11 percent)

Teacher solicits, level 5:	explanation	+.90
Student responds, level 5:	explanation	+.90
Teacher responds, level 5:	explanation	+.67
Teacher presents, level 2:	description	-.36

This factor is primarily defined by Explanation, teacher solicits--student responds.

4. Teacher presents (9 percent)

Teacher presents, level 2:	description	+.74
Teacher presents, level 5:	explanation	+.70
Teacher presents, level 4:	inference	+.66
Teacher solicits, level 2:	description	-.44
Student responds, level 2:	description	-.44

This factor is defined by teacher solicits--student responds (description) at one end, but by teacher presents (description) and two higher level categories at the other end of the axis. This suggests a lesson in which the teacher is content to supply most of the cognitive power and request a minimum level of participation from the students. At the other end of the factor is activity more characteristic of recitation (but not drill, which is level 1 behavior).

5. Association, drill (9 percent)

Teacher solicits, level 1:	association	.99
Student responds, level 1:	association	.99

Here we have a question-answer pattern in the association category, undoubtedly indicating drill sessions or some other rote processes occurring during class activities.

6. Description, pupil to pupil (8 percent)

Student presents, level 2:	description	.78
Student solicits, level 2:	description	.68

Student presents, level 3: conceptual .51

Teacher solicits, level 2: description -.44

When one pupil replies to another pupil's question, the first pupil's reply is coded as presents. Therefore, the positive loadings of the first two variables in all liklihood reflect pupil to pupil exchanges on a descriptive level. The negative loading for teacher solicits, description, also suggests this interpretation is correct.

7. Higher cognitive level student behavior (8 percent)

Teacher presents, level 3: conceptual .64

Student presents, level 5: explanation .62

Student presents, level 3: conceptual .56

Student presents, level 4: inferential .48

Teacher responds, level 3: conceptual .33

This factor contains positive loadings for the three cognitively more complex student behaviors. That the teacher presents and teacher responds, level 3, categories load positively may reflect a tendency for the teacher's cognition to serve as a basis for student behavior, or that the teacher is reacting to pupil statements at this level.

8. Description interchange: student solicits-teacher responds (6 percent)

Teacher responds, level 2: description .88

Student solicits, level 2: description .49

Teacher responds, level 5: explanation .34

This factor reflects pupil questions (level 2) and teacher response at the same level, and also teacher response at a higher level, to a degree.

Factor Stability

Not all factors for each system were stable. Estimates of stability computed across each teacher's five observations are presented in Table 1. These coefficients are intraclass correlations, and indicate the reliability of both a single half-hour observation and the average of five observations. It can be seen from Table 1 that most of the factors have some stability, but that five of eight CCS factors do not. This latter result suggests that cognitive functioning in the classroom is more situationally dependent than most of the other measured classroom behaviors. It is also clear that no factor is very stable if only one half-hour of observation is used, and not very many factors achieve more than moderate stability for five half-hour observations combined.

Relationships Among the Systems

Intercorrelations among the categories of each of the systems have been factored, a final analysis was made to determine the relationships among the systems. Scores were computed for each system's factors and

Table 1

System factor stability, estimated from intraclass correlations

CASES	(one half hour)	(five half hours)	
1. Attention vs. Routine Activity	.26	.63	.001
2. Passive, inactive behavior	--	--	N.S.
3. Inappropriate vs. appropriate social behavior	.34	.71	.001
OScAR			
1. Student-idea oriented vs. teacher-idea oriented	.16	.48	.01
2. Convergent evaluative vs. Divergent teacher behavior	.36	.73	.001
3. Problem solving, teacher directed	.27	.64	.001
4. Considering - Supporting	.11	.38	.05
5. Procedural interaction vs. discussion	.13	.42	.05
6. Desisting	.39	.75	.001
7. Lecture vs. Recitatior	.28	.65	.001
8. Controlling	.11	.38	.05
FAIR			
1. Students present vs. Routine	.16	.46	.01
2. Criticizing - Resisting	.34	.71	.001
3. Teacher: Responds vs. Presents	.51	.83	.001
4. Expansive vs. Restrictive	.22	.57	.01
5. Clarifying (students)	--	--	N.S.
6. Teacher candor	.19	.52	.01
7. Supporting vs. Seeking Information	.15	.45	.05
8. Student initiated discussion	--	--	N.S.
9. Teacher tangential	--	--	N.S.

CCS	(one half hour)	(five half hours)	
1. Conceptual behavior	--	--	N.S.
2. Description vs. Inferential Behavior	--	--	N.S.
3. Explanation	.16	.48	.01
4. Teacher presents	.45	.80	.001
5. Association, drill	--	--	N.S.
6. Description, pupil to pupil	--	--	N.S.
7. Higher cognitive level student behavior	--	--	N.S.
8. Description interchange: student solicits-teacher responds	.18	.52	.01

intercorrelated across systems, then factored and rotated to the varimax solution. Eleven factors, accounting for 71 percent of the variance were obtained. These factors are presented below. Since the variables are the factors from the original analysis of each system, the component behaviors of the factors may be found in the results presented above.

Factor I: Problem Solving, Teacher directed (9 percent)

Problem Solving, Teacher directed (OScAR, 3)	.79
Expansive vs. Restrictive (FAIR, 4)	.64
Explanation (CCS, 3)	.62
Attention vs. Routine Activity (CASES, 1)	.53

To receive a high score on this factor a teacher could engage his class in some type of problem solving situation, in which he solicits explanations (CCS, Factor III). Questions tend to be followed by other questions to different students. The teacher probes student explanations, and tends to incorporate them into the on-going discourse. Although the teacher tends to make use of student ideas, he still controls the flow of discussion: none of the factors comprised by this dimension contains a student initiation category such as Questions or Generates. In fact, one factor has a negative loading for Pupil Questions (OScAR, Factor III). Students are attentive and evince some enthusiasm (Zeal).

Factor II: Pupil - Pupil interaction (9 percent)

Student-idea oriented vs. Teacher-idea oriented (OScAR, 1)	.83
Students present vs. Routine (FAIR, 1)	.81
Description, pupil to pupil (CCS, 6)	.82

This factor evidently represents activities having considerable pupil to pupil interaction, with the teacher's role being primarily to probe or ask broad questions, but not to evaluate or provide information.

The pupil behavior tends to be description, i.e. providing facts, data, rather than higher level categories, such as generalization.

Factor III: Teacher Presentation vs. Recitation (8 percent)

Lecture vs. Recitation (OScAR, 7)	+.79
Teacher presents (CCS, 4)	+.72
Teacher: Responds vs. Presents (FAIR, 3)	-.63

Behaviors associated positively with this factor are the teacher categories: Lectures, Initiates (FAIR); Informing (OScAR); Presents description, Presents explanation, Presents generalization (CCS). Negatively associated with the factor are the behaviors: (Teacher) OK's, Ponders, Corrects, Delves (FAIR); Elaborating 1 Questions, Pupil Statements, Approving Statements (OScAR); Teacher Solicits description, Student Responds description (CCS). Obviously, at one end of this dimension is the teacher lecture or presentation of information and ideas. The other end of this dimension seems somewhat less well defined. Some type of teacher directed interaction is represented, primarily at a descriptive level. Recitation appears as the most likely label for the set of behaviors, since a question-answer pattern is indicated, at a descriptive level, with accompanying teacher evaluation. Neither discussion nor drill are suitable as descriptors, since for the former we would expect but do not find student categories such as Questions, Generates, Explores, or Presents; and, for the latter the behaviors teacher solicits association-student responds association are required.

Factor IV: Criticizing Behavior (8 percent)

Criticizing, Resisting vs. Routine (FAIR, 2)	.86
Desisting (OScAR, 6)	.84
Attention vs. Routine Activity (CASES, 1)	-.48

This factor apparently reflects a coupling of some student resisting behaviors with teacher criticism and desist statements. High scores on the factor probably represents teacher reaction to pupil behavior, as well as student reaction to teacher behaviors loading for the CASES factor, Attention, is not unexpected.

Factor V: Higher cognitive level vs. convergent-evaluative (6 percent)

Higher cognitive level student behavior (CCS, 7)	.70
Teacher candor (FAIR, 6)	-.43
Convergent-evaluative vs. Divergent teacher behavior (OScAR, 2)	-.64

A high score on this factor would be received by a teacher who asked many divergent questions and whose class engaged in explaining, inferring and conceptual (grouping attributes, defining concepts) behavior. A low score on the factor indicates relatively greater numbers of convergent questions, approving and rejecting teacher statements and a smaller number of pupil behaviors occurring at higher cognitive levels. The negative loading of the Teacher candor variable suggests that "owning-up" on the part of the teacher is more likely with a convergent-evaluative set, because a mistake by a teacher is more obvious in such an activity than in higher level divergent interchanges.

Factor VI: Positive affect (6 percent)

Considering, Supporting (OScAR, 4)	.80
Supporting vs. Seeking Information (FAIR, 7)	+.45

The teacher behaviors which primarily define this factor are those usually associated with positive affect: Considering, Supporting, (OScAR); Nutures (FAIR). Behaviors having lower correlations with the variables

(convergent questions directing) or low negative correlations (lectures, student encourages, explores) suggest that this positive affect is more likely in classes where teachers are more restrictive of student behavior.

Factor VII: Student initiated discussion vs. procedural interaction (6 percent)

Student initiated discussion (FAIR, 8)	+.84
Description interchange, student solicits-teacher responds (CCS, 8)	+.53
Procedural Interaction vs. discussion (OScAR, 5)	-.55

Behaviors contributing to variables at one end of this dimension are, for students, Generates, Explores, Questions, (FAIR), Pupil Statements (OScAR), Student solicits description (CCS); and for teachers, Confirms (FAIR), Problem Structuring Statements (OScAR), Teacher Responds description, Teacher Responds explanation (CCS). This latter end of the dimension most clearly resembles a student initiated discussion. The other end of the dimension is correlated with variables defined by the teacher behaviors: Procedural non-substantive question, directing (OScAR); and the student behaviors: non-substantive utterances (OScAR) and Zeal (FAIR). Except for Zeal, these are all OScAR behaviors, and indicate procedural interactions.

Factor VIII: Descriptive convergent vs. inferential divergent interchanges (5 percent)

Description vs. Inference (CCS, 2)	.80
Clarifying (students) (FAIR, 5)	.64
Convergent evaluative vs. divergent teacher behavior (OScAR, 2)	.42

At one pole of factor VIII are teacher question-student response interchanges (convergent) at a descriptive level. Also included are the

student behaviors: Suggests, Ok's, How, from the FAIR factor Clarifying. A low score on this factor could be obtained by, in addition to an absence of the preceding behaviors, greater amounts of inferential student and teacher behavior along with divergent teacher questions.

Factor IX: Controlling (5 percent)

Controlling (OScAR, 8)	.85
Teacher candor (FAIR, 6)	-.44

Factor IX is basically the OScAR, VIII, factor. It contains Teacher rebuking statements, procedural positive statements, and procedural, non-substantive, questions. The negative loading of FAIR factor (VI): Teacher candor means that these types of control statements, taken together, are more likely to be observed in classes having teachers who do not admit mistakes, or whose students are not often observed as enthusiastic (Zeal).

Factor X: Conceptual (5 percent)

Conceptual Behavior (CCS, 1)	+.76
Teacher tangential (FAIR, 9)	-.51

Conceptual Behavior, (CCS factor I) consists mainly of teacher solicits-student responds interchanges at the conceptual level. Behavior coded in the conceptual category is beyond simple, concrete, description, and generally includes defining concepts, differentiating attributes, looking for or providing the meaning or origin of words, concepts, terms. The negative loading for Teacher Tangential indicates that there is somewhat less tendency for this type of teacher behavior to be observed during activities in which conceptual behavior is found.

Factor XI: Associative behavior (4 percent)

Association, drill (CCS, 5)	.74
Passive, inactive student behavior (CASES, 2)	.58

The defining variable for factor XI consists of teacher solicits- student responds at the associative or rote level. The primary behaviors defining the CASES variable are observes passively and responds to internal stimuli, which are understandable activities when the observed students are not participating in the associative interchanges.

Discussion

The elven dimensions of classroom behavior presented in this report represent over-lap among factors obtained from each of the four coding systems. However, not all the systems' factors correlated highly with final dimensions. CASES factor 3 (Inappropriate vs. Appropriate social behavior) did not have even a moderate loading on any factor, and several others had moderate loadings only (CASES factors 1 and 2, FAIR factors 6, 7, and 9; OScAR factor 5, and CCS factor 8). Such factors primarily represent dimensions unique to their respective observation systems.

Moreover, if two variables from different systems correlate with the same factor it does not necessarily mean the variables are measuring the same thing. In many cases the different variables are complementary. For example, factor V has high loadings for both CCS 7 (Higher cognitive level student behavior, +.70) and OScAR 2 (Convergent evaluative vs. divergent teacher behavior, -.64). This does not seem to be simply the same behavior labeled in two different ways. Rather, OScAR, 2 and CCS, 7 represent different clusters of behaviors which are related. Additional dimensions with complementary variables appear to be I, VII, VIII, IX, X, XI, and possibly factor II. Other dimensions consist primarily of variables that are essentially the same behaviors. For example, Factor III, Teacher Presentation vs. recitation, is made up of CCS 4, FAIR 3, OScAR 7, all of which contrast teacher lecture with routine question-answer interchanges.

The relatively low stability coefficients for the factors from the four systems ought to be a caveat to those using behavioral observation to obtain outcome variables or process measures in research or evaluation studies. Since the factors are combinations of two or more categories, researchers who use single behaviors as variables should be even more cautious. It is obvious that a single half hour observation is nearly worthless for any purpose, and often much more observation may be required before we would be comfortable with the measure. An alternative to more observation might be increasing the amount of control over the observational setting (e.g., standard lessons including uniform objectives and identical instructional materials). Such controls might reduce extraneous sources of variance and thus increase stability of measures. Such control would be especially appropriate in studies having cognitively oriented observation categories.

With regard to the factors obtained in this study, no implication is intended that they are the primary dimensions of classroom behavior. Certainly the factors that are found in any such study as this are products of a number of things, including the particular systems employed to observe behavior. Thus a study (Ober, Wood, and Cunningham, 1970) that used, among others, systems designed to assess type of imagery and degree of experimentalism, obtained factors for imagery and for experimentalism.

It is also the case that the observational methodology employed in the study may strongly influence the number and nature of factors. Thus Ryans' (1960) study of teacher characteristics, using behaviorally referenced rating scales, obtained four factors:

I. Friendly warm, understanding vs. Aloof, egocentric, restricted

II. Responsible, organized, businesslike vs. Unplanned, sliphod, evading

III. Intellectually stimulating, surgent, enthusiastic, imaginative vs. Dull, routine

IV. Attractive, expressive vs. Unimpressive, inexpressive.

Moreover, Ryans cites (1963) several other studies carried out in elementary school and college classrooms which employed factor analyses of observer ratings or pupil ratings of teachers. From these studies a number of factors emerged which were similar to the factors obtained in Ryans' teacher characteristics study Some common points are evident between Ryans' factors and those produced in the present study. Behaviors characteristic of Ryans' factor I teachers are consonant with this study's factor VI (Positive affect); Ryans' factor II is related to this study's factors I (Problem solving) and V (High level cognition vs. convergent evaluative) and possibly others. Despite the covergences, it is clear that there are many differences between other factors. It seems reasonable to conclude that the greater number of factors in the present study (and in other studies using observation systems) are a result of the measurement procedure and the avoidance of halo effects in behavioral observation, as well as to differences in the behaviors defined on the rating scales or observation systems.

The study whose factors more closely approximate those presented in this report is Medley and Hill's (1968) comparison of OScAR (form 4) and Flanders' Interaction Analysis. Seventy student teachers were observed on four occasions for 20 minutes, using both systems. Ten factors were obtained, many of which are quite similar to those found here. For example, the Medley-Hill factor Lecturing Behaviors contrasts continued teacher lecturing with student response. Its analogue in this study is Teacher presentation vs recitation (III). Question type, contrasting convergent and divergent - elaborating questioning styles, is similar to Descriptive convergent vs. inferential divergent (VIII). Pupil initiations seems closely related to one pole of Student initiated discussion vs. procedural interaction (VII). Listening behavior, which includes continuing pupil statements, and student

talk longer than 3 seconds, closely approximates Pupil-to-pupil interaction (II). In addition some resemblance appears between Criticizing Behavior factors for both analyses, between Extended Accepting Behaviors and Positive Affect (VI) and possibly Question Difficulty and Higher level cognition vs. convergent evaluative (V). Three additional factors in Medley and Hill's analysis do not have apparent counterparts in this study. Of the three factors; Permissive Behavior and Managing Behavior are parts of other factors in the present study, and Question Source is nowhere in sight. On the other hand, this study's factors I, IX, X, and XI are unique. The non-overlapping factors may have resulted from many things, chief of which are differences in the observation procedures and instruments, methods for scaling variables, the samples of teachers employed, and just plain error. However, the fact that six, and possibly seven, of the factors from the two studies do appear to share common groups of behaviors, suggests that at least th e factors are of some significance for further studies of classroom behavior. In particular, studies comparing different instructional methods might anchor their definitions in the dimensions (e.g. one type of "discussion" could be defined as high scores on factor II). By using these or other behavioral dimensions, one's instructional procedure could be differentiated systematically from others (cf. Gage, 1969).

These dimensions might also be used for feedback purposes or self-assessment with teachers. Simpler observation procedures than the original systems could be constructed (e.g. some combination of behavior check lists and behaviorally keyed ratings) and used to provide a teacher with an assessment of where his lesson/style fits in the behavior space of teaching. The dimensions might also provide a rich source for suggestions about changing one's teaching behavior by developing alternate strategies, based upon the defining behaviors, to practice in a laboratory or microteaching setting.

APPENDIX

Definitions of categories and inter-observer agreement coefficients for each system.

1. CASES
2. FAIR
3. OScAR
4. CCS

A Coping Analysis Schedule

for Educational Settings (CASES)[a]

1. Aggressive Behavior:

   Direct attack: grabbing, pushing, hitting, pulling, kicking, name-calling; destroying property: smashing, tearing, breaking.

2. Negative (Inappropriate) Attention-Getting Behavior:

   Annoying, bothering, whining, loud talking (unnecessarily), attention-getting aversive noise-making, belittling, criticizing.

3. Manipulation, Controlling, and Directing Others:

   Manipulating, bossing, commanding, directing, enforcing rules, conniving, wheedling, controlling.

4. Resisting Authority:

   Resisting, delaying; passive aggressive behavior; pretending to conform, conforming to the letter but not the spirit; defensive checking.

5. Self-Directed Activity (Appropriate):

   Productive working; reading, writing, constructing with interest; self-directed dramatic play (with high involvement).

6. Paying Close Attention; Thinking, Pondering:

   Listening attentively, watching carefully; concentrating on a story being told, a film being watched, a record played; thinking, pondering, reflecting.

7. Integrative Sharing and Helping (Appropriate):

   Contributing ideas, interests, materials, helping; responding by showing feelings (laughing, smiling, etc.) in audience situation; initiating conversation.

8. Integrative Sharing and Helping (same as 7, Inappropriate):

9. Integrative Seeking and Receiving Support, Assistance and Information:

   Bidding or asking teachers or significant peers for help, support, sympathy, affection, etc., being helped; receiving assistance.

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[a]Categories adapted from Spaulding, 1966.

10. Following Directions Passively and Submissively:

Doing assigned work without enthusiasm or great interest; submitting to requests; answering directed questions; waiting for instructions as directed.

11. Observing Passively:

Visual wandering with short fixations; watching others work, checking on noises or movements; checking on activities of adults or peers.

12. Responding to Internal Stimuli:

Daydreaming; sleeping; rocking or fidgeting; (not in transaction with external stimuli).

13. Physical Withdrawal or Passive Avoidance:

Moving away; hiding: avoiding transactions by movement away or around; physical wandering avoiding involvement in activities.

14. Self-Directed Activity (same as 5, Inappropriate):

Between Observer Agreement for CASES

Category	r_1	r_c
Aggressive behavior	a	--
Negative attention-getting	a	--
Manipulating and directing	a	--
Resisting authority	a	--
Self-directed, appropriate	.12	N.S.
Paying attention	.70	.001
Appropriate sharing, helping	.98	.001
Inappropriate sharing, helping	.81	.001
Seeks support, information	.54	.001
Follows directions	.68	.001
Observes passively	.35	.001
Responds to internal stimuli	.31	.01
Physical withdrawal	a	--
Inappropriate self-directed	.51	.001

NOTE--Coefficients are intraclass correlations, estimated from four coders and 20 tapes, four coders per tape. The coefficients reported are estimates of the reliability of individual observers. Only reliable ($p < .01$) categories were used in subsequent analyses.

FAIR CATEGORIES (Fuller, 1970)

Teacher Categories	Student Categories
Values. Values feelings; identifies; shares. Listens attentively. Unqualified acceptance. Includes laughing with someone, "I feel that way too." (Person oriented.)	Zeal. Student responds eagerly; waves hand. Listens attentively. Values or recognizes another's feelings. Includes pleasure, appreciation, good mood, laughing with someone. "Oh, Boy!" "Me first!" (Affect.)
Nurtures. Teacher gives focused encouragement. Guides. Hints. "Come on, Johnny, you know this one." Gives praise, approval to previous behavior. Smiles. Includes recognition of student volunteer, and "Thank you for helping me." (Affect.)	Encourages. Encourages teacher or another student to go on. Includes "Thank you for helping me." Gives approval; praises. "You got it right." Includes choosing in a game, election, panel.
O.K. "That's the right answer." Confirms content in drill pattern without using student response or shifting.	O.K. Any acknowledgment that the teacher is right (acquiescence), that is not included in another category. Includes "Yes, sir." "Yes, ma'am."
Delves. Probes the meaning of a student response. Asks for more information about a student response. Asks for feedback on teacher (own) interpretation, reflection, or incorporation of student idea. "Do I understand?" "What do you think of what Bill said?" Correctness of student response is not an issue. (Task oriented.)	Explores. Student asks for information; may be incorporating teacher idea in response. Student gets teacher or another student to give idea, talk. "But why?" "Is it like what we did yesterday?" (Task oriented.)
Confirms. Incorporates student ideas and uses them in lecture. Responsively gives information or opinion; attentive to student feedback and questions. Includes repeating; also, interrupting self to call on a student. Shifts action on basis of previous student response, suggestion.	Usual. Routine feedback in response to teacher direction, questions, whether response is correct or not.
Ponders. "I'm not sure." "Well... maybe, but..." Ponders a student response or expresses doubt. "I wonder though..." Qualified acceptance. Disagrees with response given, but seeks alternatives. Includes "Don't you understand?"	Questions. Questions or ponders a preceding response by doubting, arguing, or bringing up new information. "But yesterday..." "I don't get it."

FAIR CATEGORIES (continued)

Teacher Categories	Student Categories
Corrects. "That's the wrong answer." "Do this." "Quit that." Behavior change requested is specified. Corrects or questions what preceded; opportunity for right response offered. May be serious or humorous.	Suggests. Student requests change of behavior. Makes correcting suggestion. "Why don't we..." May be serious or humorous.
Criticizes. Minimally student behavior condemned. Change of behavior requested but no "second chance" given to make correction. Includes cold, hostile, sarcastic remarks, scolding, teasing, and belittling.	Resists. Student resists. Openly ignores teacher, e.g. rudeness, hostility, aggressive antipathy, obvious footdragging, "Aw, nuts."
Yea. Teacher praises self; expresses self-approval. "I was right in the first place." Includes denial of mistake. "I didn't add it wrong." "That was the right thing for me to do." "I still think I'm right."	Rejoice. Student praises self; expresses self-approval. "I got it right." "Now I understand."
Tangential. Tangential talk or action to self. Teacher "out to lunch." Sighs; looks out window. Fusses with objects, shuffles papers, stands by indecisively.	Woolgathering. Extraneous behavior with only self involved. Not work oriented. Bored, yawning, sleeping. Includes rest periods in primary.
Owns up. Scolds self; expresses self-disapproavl; admits error. "I don't know what's the matter with me today." Here's my mistake." "That was the wrong thing for me to do." Checks own board work. Checks her own grading of student work (including at request of student.)	Admits. Student owns up or admits error. "I don't understand." "I got that one wrong." Expresses self-disapproval. Includes self-punitive actions: banging fist on desk, if directed against self.
Initiates. Initiates a probe or asks broad question. (Open-ended question: "What if...").	Generates. Student initiates; asks for new information on own or offers own ideas.
Manages. Teacher gives procedural directions. Teacher asks narrow question (questions with specific, predictable answer.) May be either substantive or procedural.	How. Student asks for "the" answer; asks for directions on how to do something without reference to preceding teacher behavior. Asks if preceding answer is right; also, if it is O.K. to do something.

FAIR CATEGORIES (continued)

Teacher Categories	Student Categories
Lectures. Gives information or opinion; not in response to feedback. Students are passively receptive (listening.) Includes ignoring student attempts to participate.	Brings out. Student gives information or opinion. Reads report; recites.

BETWEEN OBSERVER AGREEMENT FOR FAIR CATEGORIES

Teacher Behavior	ρ	$p <$	Pupil Behavior	ρ	$p <$
Values	a	--	Zeal	.64	.001
Nurtures	.51	.001	Encourages	.80	.001
OK's	.83	.001	OK"s	.51	.001
Delves	.65	.001	Explores	.47	.001
Confirms	.85	.001	Usual	.82	.001
Ponders	.67	.001	Questions	.68	.001
Corrects	.89	.001	Suggests	.35	.01
Criticizes	.37	.01	Resists	.62	.001
Self-Praise	a	--	Self-Praise	.12	N.S.
Tangential	.48	.001	Wool-gathering	.02	N.S.
Owns-up	.37	.01	Admits, Owns-up	.28	.05
Initiates	.49	.001	Initiates, Generates	.82	.001
Manages	.66	.001	Asks How, or Directions	.52	.001
Lectures	.83	.001	Gives Information, Opinion	.86	.001

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[a] Behavior occurred too infrequently to estimate reliability.

NOTE--Coefficients are intraclass correlations estimated from 4 coders and and 125 tapes, two coders per tape. The coefficients reported are estimates of the reliability of pairs of observers. Only reliable ($p \leq .01$) categories were used in subsequent analyses.

Description of OScAR 5V Categories[a]

Pupil Utterance Non-Substantive. Pupil makes a statement or asks a question not related to substance.

Pupil Question Substantive. Pupil asks for substantive information.

Pupil Statement Substantive. Pupil offers substantive information.

Pupil Response. Pupil responds directly to another pupil or indirectly to the teacher.

Problem Structuring Statement. Teacher raises a substantive question or sets a problem (without indicating who is to answer it.)

Convergent Question. Teacher asks a pupil a question which calls for one right answer. (Pupil has to be identified. Pointing included.)

Elaborating 1 Question. Teacher directs question to the same pupil who answered the question preceding it.

Elaborating 2 Question. Teacher directs question to a different pupil then the preceding question. The second pupil must have heard the answer to the previous question.

Divergent Question. Teacher asks pupil a question to which more than one answer may be acceptable or correct. (Pointing included.)

No evaluation. Teacher does not reply to pupil utterance.

Considering. Teacher shows consideration for pupil or awareness of his desires.

Supporting. Teacher reacts to pupil response with positive affect, praise, encouragement.

Informing. Teacher gives information. (Lecture.)

Describing. Teacher describes procedure or makes statement not otherwise classifiable.

Approving. Teacher indicates, in a neutral way, that an answer was correct or acceptable.

Directing. Teacher commands a pupil to do something.

Accepting. Teacher accepts (acknowledges) pupil response.

Rejecting. Teacher indicates in a neutral way, that a pupil response was unacceptable or incorrect.

Rebuking. Teacher utterance with negative affect. Belittling, scolding, embarrassing.

Criticizing. Teacher reacts to pupil response with negative affect. Belittles, scolds, etc.

Desisting. Teacher commands pupil to stop doing something (in a neutral way) or refuses permission.

Procedural, Neutral-Non- Substantive Question. Teacher asks question not otherwise classifiable; teacher neither refuses or gives permission.

Procedural Positive. Teacher utterances which offer a pupil a chance to initiate procedure. (Or teacher gives permission.)

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[a]Adapted from Medley, et al., 1968.

BETWEEN OBSERVER AGREEMENT FOR OScAR (5) CATEGORIES

Category	r	f
Pupil Utterance, non-substantive	.72	.001
Pupil Question, substantive	.84	.001
Pupil Statement, substantive	.85	.001
Pupil Response	.91	.001
Teacher Behaviors		
Problem Structuring Statement	.91	.001
Convergent Question	.90	.001
Elaborating Question (1)	.95	.001
Elaborating Question (2)	.78	.001
Divergent Question	.81	.001
No Evaluation	.93	.001
Considering Statement	.64	.001
Informing Statement	.91	.001
Describing	.27	.05
Directing	.92	.001
Rebuking	.80	.001
Desisting	.81	.001
Supporting	.86	.001
Approving	.52	.001
Accepting	.26	.05
Rejecting	.78	.001
Criticizing	.18	N.S.
Procedural, Neutral Question, non-substantive	.43	.001
Procedural Positive	.59	.001

NOTE--Coefficients are intraclass correlations, estimated from 4 coders and 125 tapes, two coders per tape. The coefficients reported are estimates of the reliability of pairs of observers. Only reliable ($p < .01$) categories were used in subsequent analyses.

COGNITIVE COMPONENT SYSTEM (Emmer & Albrecht, 1970)

Categories:

1. Association

   Verbatim reproduction of verbal sequences. A stimulus-response chain without apparent mediators.
   Memorization, Rote Processes, Drill.
   Recall, not necessarily with comprehension.

2. Description

   Stating facts (even if incorrect) or giving data with understanding.
   Describing appearance, characteristics, physical attributes.
   Enumerating, listing.
   Defining something concrete (e.g. a horse).

3. Conceptualization

   Abstract level. Defining a concept with non-physical referents.(e.g. democracy).
   Concept formation.
   Differentiating concepts, comparing attributes of concepts, even if the attributes are concrete.
   Looking for the meaning or origin of words, concepts, or terms.
   Combining concepts.

4. Inference, generalization

   Drawing conclusions from data.
   Hypothesis testing.
   Drawing a principle from data, not merely describing it.
   Speculating "what would happen if?"

5. Explanation

   Invoking principles or concepts to explain some phenomenon or event.
   Giving reasons for a stated conclusion or solution. (Conclusion may have been stated by someone else).
   May be within the context of the lesson or problem, or extended, calling for new principles.

Between observer agreement for CCS categories.

CATEGORY / TEACHER			CATEGORY / STUDENT		
Presents			Presents		
Association	a	-	Association	a	-
Description	.93	.001	Description	.89	.001
Conceptualization	.68	.01	Conceptualization	.65	.01
Inference	.72	.001	Inference	.78	.001
Explanation	.84	.001	Explanation	.92	.001
Solicits			Solicits		
Association	.98	.001	Association	a	-
Description	.96	.001	Description	.88	.001
Conceptualization	.90	.001	Conceptualization	a	-
Inference	.70	.01	Inference	a	-
Explanation	.87	.001	Explanation	a	-
Responds			Responds		
Association	a	-	Association	.83	.001
Description	.90	.001	Description	.95	.001
Conceptualization	.82	.001	Conceptualization	.78	.001
Inference	.73	.001	Inference	.11	N.S.
Explanation	.83	.001	Explanation	.81	.001

[a]Insufficient behavior to be reliably observed on sample tapes.

Note--Coefficients are intraclass correlations, estimated from two coders and 15 half-hour lessons. The coefficients presented are estimates of the reliability of individual observers. Only reliable ($p < .01$) categories were retained in subsequent analyses.

REFERENCES

Emmer, E. T. and Albrecht, I. D. The Cognitive Components System Manual. The Research and Development Center for Teacher Education, The University of Texas at Austin, 1970.

Fuller, F. F. FAIR System Manual. The Research and Development Center for Teacher Education, The University of Texas at Austin, 1970.

Gage, N. L. Teaching Methods. in Ebel, Robert L. (ed.) Encyclopedia of Educational Research, 4th edition, 1969.

Medley, D. M. and Hill, R. A. A comparison of two techniques for analyzing classroom behaviors. Paper presented at the annual meeting of the American Educational Research Association. Chicago, Illinois, Feb., 1968.

Medley, D. M., Schluck, C. G. and Ames, N. P. Assessing the Learning Environment in the Classroom: A Manual for Uses of OScAR 5V. Princeton,N.J.: ETS, 1968.

Ober, R. L., Wood, S. E., and Cunningham, G. Simultaneous use of four different observational systems to assess student teacher classroom behavior. Paper presented at the annual meeting of the American Educational Research Association. Minneapolis, Minn., March, 1970.

Ryans, D. G. A theory of instruction with special reference to the teacher: an information system approach. The Journal of Experimental Education. 32, 2, 1963; pp. 191-223.

Ryans, D. G. Characteristics of Teachers. Washington, D. C.: American Council on Education, 1960.

Simon, A., and Boyer, E. G. (eds.) Mirrors for Behavior. Philadelphia, Pa.: Research for Better Schools, Inc. Vol. I-VI: 1967; Vol. VII-XIV, Summary: 1970.

Spaulding, R. L. A Coping Analysis Schedule for Educational Settings (CASES). Education Improvement Program, Duke University, North Carolina, 1966.